

Listing of the Claims

1. (Cancelled)
2. (Cancelled)
3. (Previously Amended) The apparatus as described in claim 8, wherein each module of the plurality of modules includes an annular lip at either the first end or the second end of the shell and an annular recessed portion at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module.
4. (Previously Amended) The apparatus as described in claim 8, wherein at least one module of the plurality of modules includes an annular layer of thermally insulative material disposed between the shell and the respective processing core.
5. (Previously Amended) The apparatus as described in claim 8, wherein at least one module of the plurality of modules includes a porous support member mounted in proximity to the first end of the shell.
6. (Previously Amended) The apparatus as described in claim 8, wherein at least one module of the plurality of modules includes a porous support member mounted in proximity to the second end of the shell.
7. (Original) The apparatus as described in claim 6, wherein the porous support member is selected from the group consisting of a screen, mesh, perforated plate, and porous sintered plate.

8. (Previously Amended) An apparatus for converting hydrocarbon fuel into a hydrogen rich gas, comprising a plurality of modules stacked end-to-end along a common axis, wherein each module of the plurality of modules includes:

a shell having an interior space defining a passageway for the flow of a gas stream from a first end of the shell to a second end of the shell opposite the first end, and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially therethrough; and

wherein the plurality of modules includes a first module, wherein the processing core of the first module includes a partial oxidation catalyst.

9. (Original) The apparatus as described in claim 8, wherein the first module also includes a steam reforming catalyst.
10. (Original) The apparatus as described in claim 8, wherein the partial oxidation catalyst includes a metal selected from the group consisting of platinum, palladium, rhodium, ruthenium, nickel, cobalt, and any combinations thereof.
11. (Original) The apparatus as described in claim 9, wherein the steam reforming catalyst includes a metal selected from the group consisting of platinum, palladium, rhodium, ruthenium, iridium, nickel, potassium, and combinations thereof.
12. (Original) The apparatus as described in claim 10, wherein the metal of the partial oxidation catalyst is supported on a material selected from the group consisting of magnesia, alumina, titania, zirconia, and silica.

13. (Original) The apparatus as described in claim 11, wherein the metal of the steam reforming catalyst is supported on a material selected from the group consisting of magnesia, alumina, silica, zirconia, and magnesium aluminate.
14. (Previously Amended) The apparatus as described in claim 8, wherein the plurality of modules includes a second module, wherein the processing core of the second module includes a first heat exchanger for cooling the gas stream.
15. (Previously Amended) The apparatus as described in claim 8, wherein the plurality of modules includes a third module, wherein the processing core of the third module includes a desulfurization agent.
16. (Previously Amended) The apparatus as described in claim 15, wherein the desulfurization agent includes zinc oxide.
17. (Cancelled)
18. (Previously Amended) The apparatus as described in claim 19, wherein the inert material comprises ceramic beads.
19. (Previously Amended) An apparatus for converting hydrocarbon fuel into a hydrogen rich gas, comprising a plurality of modules stacked end-to-end along a common axis, wherein each module of the plurality of modules includes:

a shell having an interior space defining a passageway for the flow of a gas stream from a first end of the shell to a second end of the shell opposite the first end, and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially therethrough;

wherein the plurality of modules includes a fourth module, wherein the processing core of the fourth module includes an inert material for mixing components of the gas stream passing therethrough and a feed nozzle for introducing water to the gas stream.

20. (Previously Amended) The apparatus as described in claim 8, wherein the plurality of modules includes a fifth module, wherein the processing core of the fifth module includes: a water gas shift catalyst bed; and a heat exchanger positioned within the water gas shift catalyst bed for maintaining a desired shift reaction temperature range.
21. (Original) The apparatus as described in claim 20, wherein the water gas shift catalyst is a low temperature water gas shift catalyst.
22. (Original) The apparatus as described in claim 21 wherein the low temperature water gas shift catalyst includes a material selected from the group consisting of copper, copper oxide, zinc, platinum, rhenium, palladium, rhodium, and gold.
23. (Original) The apparatus as described in claim 20, wherein the water gas shift catalyst is a high temperature water gas shift catalyst.
24. (Original) The apparatus as described in claim 23, wherein the high temperature water gas shift catalyst includes a material selected from the group consisting of ferric oxide, chromic oxide, copper, iron silicide, platinum, and palladium.
25. (Previously Amended) The apparatus as described in claim 8, wherein the plurality of modules includes a sixth module, wherein the processing core of the sixth module includes a second heat exchanger for cooling the gas stream.

26. (Previously Amended) The apparatus as described in claim 8, wherein the plurality of modules includes a seventh module, wherein the processing core of the seventh module includes: a carbon monoxide oxidation catalyst bed; and a heat exchanger positioned within the carbon monoxide oxidation catalyst bed for maintaining a desired oxidation reaction temperature range.
27. (Original) The apparatus as described in claim 26, wherein the seventh module is designed to introduce an oxygen-containing stream to the gas stream prior to contact with the carbon monoxide oxidation bed.
28. (Original) The apparatus as described in claim 26, wherein the carbon monoxide oxidation catalyst bed includes a material selected from the group consisting of platinum, palladium, iron, chromium, manganese, iron oxide, chromium oxide, manganese oxide, ruthenium, palladium, gold, and any combinations thereof.
29. (Cancelled)
30. (Cancelled)

Non-elected claims: 31-46 (Cancelled)